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ABSTRACT

The Mathematics Curriculum and Teaching Program (MCTP) is a joint initiative of the Curriculum Development Centre and the Directors of Curriculum of the States and Territories of Australia. The program seeks to improve the teaching of mathematics in grades K-10. This manual contains guidelines for people who have a responsibility for the professional development of teachers working with the MCTP. The guidelines contain two major sections. The first is a brief overview of some issues in educational change, providing essential background knowledge which sets the scene for the second section. The second section presents some practical suggestions for undertaking professional development activities and presents a range of models for professional development. It is possible to select one or more approaches from the models to encourage teachers to adopt desired features of teaching and learning. (RH)

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MATHEMATICS CURRICULUM AND TEACHING PROGRAM (MCTP)

PROFESSIONAL DEVELOPMENT GUIDELINES

"Innovation is not something that can be added on as an afterthought to be covered in a [single] workshop or through voluntary work after hours. It must be part and parcel of the job. If change in education consists of an ongoing social process and if teachers are central, that process must be a regular part of their daily work. [Fullan,M. *The Meaning of Educational Change*, p 128]

Introduction

This manual contains guidelines designed for consultants, advisers and curriculum leaders, who have a responsibility for the professional development of teachers in association with the Mathematics Curriculum and Teaching Program [MCTP].

The MCTP is a joint initiative of the Curriculum Development Centre and the Directors of Curriculum of the States and Territories of Australia. It seeks to support the improvement of teaching in mathematics in years K-10.

The guidelines contain **two** major sections. The first is a **brief overview** of some issues in educational change. This is essential background knowledge for the reader because it sets the scene for the second section; **some practical suggestions for undertaking professional development activities.** These are presented as **a range of 'models' for professional development**. From the models it possible to select one or more approaches which can be used in in-service education and other professional development activities, to encourage teachers to adopt recognised desired features of teaching and learning.

We urge you to look through all the material before you embark on your next professional development activity. Hopefully, there will be information and activity suggestions which will assist you to make future professional development work useful and rewarding for all concerned.

SECTION ONE: OVERVIEW

An Approach to Educational Change

For some time now it has been acknowledged that the ultimate responsibility for planning the content of curriculum and selecting teaching activities rests with the school. An important question is how does the curriculum and teaching in a school change to take into account recent educational developments which imply improvement in the offerings presented to students?

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There are a number of ways of supporting school level improvement. One is for an educational authority [such as a Department of Education] to respond to a need of teachers through an **innovation,** something educationally new. Most good innovations contains ideas and approaches which have the potential to improve the quality of teaching and learning. In addition they provide strategies by which these ideas and approaches can be considered by teachers with a view to using them in their schools.

This approach thus involves some research into teachers needs, development or refinement of content and teaching approaches, and then the use of techniques designed to allow teachers to make informed decisions about the worth of the innovation. The effectiveness of this strategy is thus dependent on:

- the reality of the expressed need for the innovation
- characteristics of the innovation, judged on the basis of the quality of its content and teaching approaches
- the use of successful and varied techniques designed to assist teachers to find out about, trial, and **incorporate the new content and teaching approaches into their existing repertoires.**

In the past, change based on this approach has failed because insufficient attention has been given to the above factors, in particular the third one of them.

However, before we discuss what you might be able to do in the area of dissemination it is worth reflecting on the innovation with which we are concerned. The description below may assist you in making judgements about the quality of the MCTP, one of the factors which we identified as contributing to the success of the change effort.

The Mathematics Curriculum and Teaching Program

MCTP was created in response to a perceived need for improvement in the teaching of mathematics in the nation's schools. During its initial period it has been demonstrated that teachers have been impressed by the high quality of the activities and teaching strategies assembled in the Program. Many of these activities have been developed by practising teachers.

Assumptions which underly the MCTP are that;

1. The notion of "good mathematics teaching" can be clearly articulated. For MCTP good teaching practice includes:

   - relating mathematics studies to realities in society and avoiding a too academic and abstract approach
   - developing thinking processes in students
   - offering equal access and opportunities for success to **all** students
   - giving attention to the learning process and establishing in classrooms the conditions that facilitate learning and reduce fear of failure
   - developing content areas such as numerical methods, modelling and combinatorics and challenging the place of other current content
   - using assessment strategies that build self confidence in mathematics

2. The teacher is the key person with sufficient knowledge of the environment of a particular classroom to generate change in that classroom. To be prepared to consider the MCTP, the teacher must feel the need to expand his or her current practice. There are many teachers who are unsure of the efficacy of their current practice and who see rewards through the consideration of alternatives and exploration of unfamiliar aspects of mathematics teaching.

   The MCTP is a key program at this time for facilitating this review and for providing a direction for change.

3. Ideas in the form of collections/banks of activity ideas (eg. lesson plans, units of work) are most appealing to teachers for a number of reasons. Activity ideas in the form of materials to be followed are practice-centred, allow the teacher to focus quite directly on the events of the classroom, are able to be adapted to suit individual teachers and classrooms, allow the achievement of short-term outcomes, and have usually been devised by fellow practitioners. In this respect, they provide a 'window' into how others have successfully incorporated a particular emphasis into classroom practice.

   However, the teacher must be able to adapt and modify the materials to suit the ecology of a particular classroom.

4. The illustrative lesson or demonstration is an effective condition for change particularly if the teacher is encouraged to offer critical comment, and subsequently undertakes to teach that lesson with a group of students. There is a danger that rather than empower the teacher, demonstrations by perceived 'experts' may leave the teacher feeling inadequate and underskilled.

5. The opportunity to reflect on practice [in some systematic way, such as the use of feedback sheets] must be provided if teachers are to compare the rationale/ideas of mathematics teaching and learning underlying current practice with the rationale implicit and explicit in the techniques and activities of MCTP.

6. Changes in the **attitudes or beliefs** about new approaches to teaching **follow** changes in **teaching practice**; new practices which lead to improved learning outcomes have a particularly profound effect on changing teacher attitudes.

7. The transfer of elements of the MCTP into the on-going practice of teachers is supported if teachers are given the opportunity to write their own lessons and units of work based on the view of good mathematics teaching and learning demonstrated in the trial units.

8. The involvement of a group of teachers in the school providing ongoing on-site support for one another facilitates the take-up of MCTP. In post-primary schools, the support of the mathematics department or faculty creates the organisational climate that facilitates the change process. In primary schools, the unit taking up the support role could be the total staff or teachers at a given year level.

9. The involvement of appropriate "outsiders" can encourage and support individual teachers and groups of staff to consider and implement an innovation.

The MCTP Activity Bank

Regular references are made in this manual to the MCTP materials. These are available in the form of a **BANK** of activities. The bank represents a structured set of resources which can be used in conjunction with any of the models of professional development that follow in this manual.

The activities are organised around a set of issues and the materials represent examples of successful practice which have been collected and assembled around these issues.

The materials include documentation about underlying learning principles, class organisation necessary to put the activities into use, and details about the differences in approach underlying the MCTP.

The materials are **not** seen as promoting one-off activities in the classroom. Rather, they are vehicles by which teachers can explore new educational territory. They are designed to act as agents through which teachers have access to the best ideas and approaches of others.

Ultimately the Program is about increasing teacher satisfaction through the effects the materials have on students. Through experience, it is hoped that the MCTP approaches will become the basis of maths program in schools and that teachers will internalise and value the principles on which the approaches are based.

MCTP materials are listed in a catalogue available from the Program. The materials are arranged in theme bundles for trialling by teachers and for use by consultants.

Helping to Understand Where Professional Development Might Lead

From what has been said in the above paragraph, it can be seen that teachers using the MCTP might be involved in three stages; teaching some of the MCTP developed activities and reflecting on the processes involved; teaching lessons they write themselves; and then designing whole units based on the MCTP approaches.

There is a logical sequence here. We would expect that teachers need to start by trialling MCTP lessons in order to gain familiarity with the areas of concern and the strategies used; move through writing and trialling their own lessons; then graduate to writing and trialling whole units.

The ultimate goal of the MCTP is to challenge the perceptions of teachers about the nature of effective mathematics teaching and learning, and to assist them to improve their practice. Moving through these stages may take months or even years for some teachers.

We have given these three stages the titles; **adoption, implementation**, and **continuation**. To state this more formally;

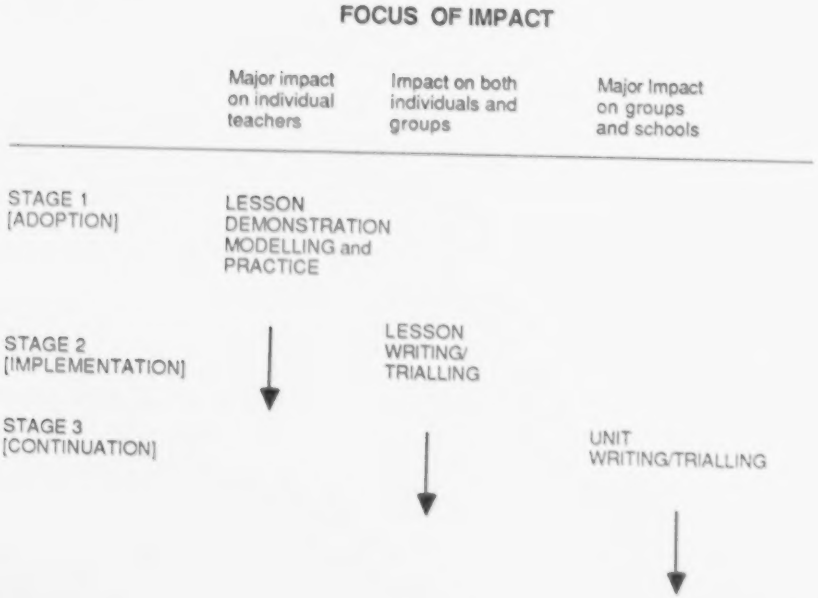
Stage 1, named **adoption**, is the initial sign of acceptance of MCTP. We suggest that an **indicator of adoption** of MCTP is the limited trialling of some of available MCTP materials.

Stage 2 called **implementation**, includes the beginning attempts to put MCTP into practice in the school setting. We suggest that an **indicator of implementation** is the writing and trialling of school-based lessons based on the MCTP approach. This would normally follow trials of centrally produced MCTP materials.

Stage 3 labelled **continuation,** or institutionalisation is concerned with sustaining the use of MCTP approaches in the school. We suggest that an **indicator of continuation** is the writing and use of mathematics units based on the MCTP approach within the total school program.

When these assumptions are considered together, it is possible to envisage an action plan for the adoption, implementation and continuation of MCTP which can be presented diagramatically:

FIGURE 1



Models of Curriculum Development for Use With the MCTP

Now that we have outlined the three stages through which teachers might consider the incorporation of MCTP approaches in their school mathematics curricula, the question remains as to how consultants might operate in practice to encourage the uptake of the MCTP materials. [We have included some information about the role of consultants in general terms, in the Appendix].

The objective of a comprehensive professional development program involving the MCTP is to **encourage teachers and schools to move through the stages.** The question is; how can this be encouraged by someone working in the consultant's role?

Part of the answer is that there are a number of approaches or **models** by which teachers might be assisted and in which consultants might operate. The models are a synthesis of good professional development practice drawn from theoretical perspectives and practical experience. The models are strategies by which the ideas and materials on the MCTP might be introduced to teachers.

At the outset, we would like to point out that the **one-shot inservice** is **not** included as one of the models. The one-shot involves a single session at which teachers get together to consider the MCTP. However, the approach is in conflict with the need for ongoing professional development. **We do not recommend this approach, as it is unlikely to lead to lasting change.**

On the pages below, we describe briefly each of the models as a basis for selecting between the approaches. Later in the manual, we present a more expanded description which you might like to consult in preparation for the use of a specific model.

1. **Structured Course**

   Here many of the processes are formalised into an organised course over a fixed time frame, perhaps over a ten week period. Teachers are released once a week from school to attend sessions where themes and the results of trials and developments which they undertake in their school between sessions are discussed.

   Broadly, the roles of the consultant are to organise the course and to arrange for and/or participate in the presentation of MCTP approaches to teachers.

2. **Sandwich**

   This generally consists of two sessions, between which school level trials of themes presented in the first session occur. These are discussed at the second session. Because of the relatively short length of the model, the emphasis is on the adoption stage.

   Broadly, the roles of the consultant are to organise the course and to arrange for and/or participate in the presentation of MCTP approaches to teachers.

   The sandwich is an attempt to take a small but important extension beyond the limitations of the 'one-shot' inservice.

3 **In-School Intensive**

   This model is conducted within a school with a group of staff, preferably the whole of the mathematics staff. The consultant (who often may be the mathematics co-ordinator for the school), develops a plan for the staff, to which they show a commitment over a given period. Depending on the length of this commitment the staff may consider one or more stages of the process.

   Broadly, the roles of the consultant are to encourage a school to become involved, to organise a program for the school, and to arrange and/or provide MCTP presentations when necessary.

4. **School Cluster Groups**

Groups of schools form a network to consider the MCTP approaches. The group uses MCTP activities and provides feedback to each other on the trials via regular group meetings of staff drawn from the cluster. Progression through the stages depends on the life and preferences of the cluster members.

Broadly, the roles of the consultant are to set up and provide maintenance activities of the group, and to arrange for and/or provide MCTP presentations when necessary.

5. **Postal**

Teachers receive and trial MCTP materials through the post and comprehensive feedback is provided to the MCTP team. This model is designed to support teachers in remote regions. The consultant may assist in organising sessions for teachers if these are possible.

Broadly, the roles of the consultant are to liaise with the MCTP team, keep in touch with the teachers concerned, and arranged for and/or provide MCTP presentations if sessions are possible.

6. **Pre-Service**

Using arrangements in pre-service teacher education, student teachers trial a small number of MCTP lessons while in schools, and in conjunction with supervising teachers and lecturers they analyse the impact of the approaches.

Broadly, the role of the consultant is to liaise with teacher education institutions and encourage them to use the model.

7. **Clinical Supervision**

This relies on the availability of a colleague within the school to provide support for use and incorporation of the MCTP approaches. Effective use of clinical supervision requires the systematic collection of data about teaching activities and the non-threatening support of a 'critical friend.'

Broadly, the role of the consultant is to encourage groups of teachers to use the clinical supervision approach if appropriate, inform them of its characteristics and provide input about the MCTP as a basis for their deliberations.

8. **Activity Documentation**

This involves the creation of networks of teachers who have progressed in the use of MCTP, perhaps to the implementation and continuation stages. The networks are designed to gather and share the activities so developed.

Broadly, the roles of the consultant are to set up the networks and maintain them.

Choosing the Right Model

An important decision for a consultant is to decide which of the models is the most appropriate one to use in a given situation. It may well be that over an extended period of time more than one model or a hybrid will be used with the same group of teachers.

The descriptions above should be a first source of information in this regard. Table 1 is a second source in that it **compares** the models on a number of criteria. These criteria are based on some recent research which suggests that there is a consistent set of professional development principles needed to achieve lasting educational change.

Professional development should:

1. address issues of concern recognised by the teachers themselves
2. take place as close as possible to the teacher's own working environment
3. take place over an extended period of time
4. have the support of both colleagues and the school administration
5. provide opportunities for reflection and feedback
6. enable participating teachers to feel a substantial degree of ownership
7. involve a conscious commitment on the part of the teacher
8. use the services of a consultant and/or critical friend

Each model has been been assessed for the degree to which it contains each of these characteristics, given that the model is used in its 'ideal form'.

It can be seen that the far right-hand column of Table 1 describes the services of the consultant in the use of the model. We have used terms here which need to be explained.

The first is **interactive strategies.** By this we mean involvement in activities designed to assist teachers come to grips with the content and processes of the MCTP. Teaching a demonstration lesson, writing a lesson and leading a group discussion on the worth of the lesson are examples of a consultant being involved in interactive strategies.

The second is **logistics.** By this we mean organisational and administrative roles of the consultant in setting up and maintaining a model. Planning the details of a session and ensuring that teachers know what to expect are examples of logistics.

While the information in Table 1 should be considered, it should also be said at this point that the local conditions and restrictions will almost certainly be a factor in choosing the model you can use. It may also be necessary to use a variation of one of the models we have presented. However, we do strongly suggest that you encourage teachers to recognise the need to move through the three stages of use of the MCTP approach.

Again, we do urge you to turn away from pressure to use the one-shot approaches to professional development. The evidence is overwhelming that teachers must have the benefit of time to reflect on the MCTP approach and to use it in their schools, and to interact with school colleagues if real change is to take place in mathematics teaching.

SECTION TWO: THE MODELS IN MORE DETAIL

We now turn to the models in more detail. For each there is a brief description of its characteristics. In addition, information of a practical nature such as some existing users of the model is included. The detail varies and this is due to the extent of existing information about the model

TABLE 1 MODEL	PROGRESSION THROUGH STAGES	ADDRESSES TEACHER ISSUES	IN TEACHERS ENVIRONMENT	ON-GOING OVER TIME	SUPPORT OF COLLEAGUES IN SCHOOLS	OPPORTUNITY FOR FEEDBACK	OWNERSHIP DEVELOPED	DEVELOPS COMMITMENT	CONSULTANTS ROLE
1. structured course	all stages can be covered if course is of sufficient length	yes	school level practice encouraged	strong feature of model	between sessions	yes, feature of sessions	develops over time	develops over time	interactive strategies [sessions] logistics
2. sandwich model	concentration on adoption	yes	school-level practice between sessions encouraged	limited to early stages	restricted to participating teachers	yes, in sessions	to a limited extent	to a limited extent	interactive strategies [sessions] logistics
3. in-school intensive	concentration on adoption and implemention but all stages could be considered	yes	yes	strong feature of model	strong feature relies on school support for on-going activities	yes, if sessions well structured	yes	yes	maybe interactive strategies logistics
4. school cluster groups	concentration on adoption and implementation but all stages could be considered	yes	yes	yes	between sessions	yes, if sessions well structured	yes strong feature	particularly those involved in cluster meetings	maybe interactive strategies logistics
5. postal	probable concentration on adoption	yes	not neccessarily present	yes	possible but not influenced by consultant	no	yes	possible, but not influenced by consultant	interactive strategies unlikely logistics
6. pre-service	probable concentration on adoption	yes	yes	limited to teaching rounds	support of supervising teacher and lecturers	yes	to some extent	to some extent	liaison with institutions
7. clinical supervision	may involve all stages	yes	yes	yes	yes	depends on the sessions	yes	yes	limited to invitation
8. activity documentation	concentration on implementation and continuation	yes	yes	yes	not necessarily present	yes	probably already developed	yes	acts as a cog in a wheel logistics
One-shot model	unlikely to consider adoption [or other stages]	to some extent	maybe	no	maybe	no	unlikely	maybe	information giving

STRUCTURED COURSE

Description

In this approach, the innovation is considered during an organised sequential course conducted on a regular basis over a fixed time frame, for example once a week for a three hourly session over a period of eight weeks.

The course is organised and largely conducted by consultants. In addition to participation in the sessions, teachers are expected to use intervening periods to try the new activities and approaches in their schools.

Teachers from a number of schools are involved and are likely to have been given time release to attend the course, but it could also be held out of school time. A variation of the approach is to involve small groups of teachers from a number of schools. This is designed to build within-school support between sessions and to encourage on-going commitment to school use of the innovation.

The approach is predicated on a cyclic notion of change involving new information, trial, and feedback. This is repeated a number of times during the course. There is thus a gradual accruition of knowledge of the innovation as the work of one cycle builds on the previous one.

The approach relies heavily on the ability of consultants to provide sessions which link together to provide a coherent offering which reflects the needs of the teachers. Teachers expect clear directions about where the course is leading and how it will be structured, for example written course outlines, preferably distributed early in the course [perhaps after negotiation between consultant and teachers].

Structured Course and the MCTP

Given the nature of the MCTP, the approach should comence with an introduction to the MCTP materials, perhaps within the context of the need to change the nature of mathematics teaching. Demonstration and trials of the materials would follow. It is helpful if these simulation lessons could be held in course sessions or alternatively the consultant could demonstrate lessons. The fall back, but much less powerful position is to use a video and ask people to critically examine the teaching approach shown. There would be merit in examining small sections of the lesson or critical incidents which affect the flow of instruction.

There should be an emphasis on participants **doing** and **trying** rather than listening and being told about the approach. The second phase of writing lessons should only follow after the participants have had a chance to thoroughly try the approach themselves. Later sessions could be devoted to working in groups to refine lessons written by individuals and reports on trialling them.

Finally, groups of participants could be encouraged to write a unit based on the rationale of the MCTP approach. At this stage, participants might need assistance with some curriculum models on which to base their specific unit. There should be an emphasis in the units on sequence of the activities and an internal consistency of aims, content, methods and assessment.

It is important that participants not be rushed through the processes. The trick is to blend an overall up-front plan with flexibility of emphasis at different stages of the total course.

Examples of Structured Course

Several effective structured courses (not directly related to MCTP) have been generated with the Basic Learning in Primary Schools (BLIPS) program. These include:

MINC : Maths Inservice Network Course, ACT Schools Authority (062-95-4376)
EMIC : Exploring Maths in Classrooms, Victorian Ministry of Education (03-628-2211)
MITEY : Maths In The Early Years, WA Education Department (09-420-4111)
TIME : Teachers Investigating Mathematics Education, NSW Education Department (02-266-0044).

Although these have been developed in the K-3 area, the structures are clearly valid and valuable for other levels.

STRUCTURED COURSE

	ADOPTION	IMPLEMENTATION	CONTINUATION
Overview	All stages can be covered if course is of sufficient length.		
ROLES OF CONSULTANTS			
Interactive Strategies	-demonstration of the MCTP approach to participants and/or -arrangements by which an 'outside consultant' or capable teacher can demonstrate the MCTP approach -encouragement for teacher to try the approach in the sessions -building a commitment among participants to try lessons in their schools -linking the need for the approach to the existing views of the teacher.	-encouraging teacher to write lessons in in sessions -encouraging teacher to trial sessions in their schools -hosting feedback sessions on these activities	-encouraging teacher to write unit outlines based on MCTP in sessions -hosting feedback on on these tasks

Logistics

- provision of a coherent total program; sessions must link together over the life of the course.
- building a sense of cooperation between teachers in the course.
- monitoring the progress of the teachers through the stages of the process to ensure an appropriate note of progression.
- organising 'outside consultants' to be present at suitable sessions.
- arranging for publicity about the course and its evaluation.
- stress is placed on adoption and to some extent on implementation. Emphasis on implementation /continuation phases depends on length of course.

SANDWICH MODEL

Description

The major characteristic of this approach is for teachers to undertake experiences in schools [such as classroom practice] between seminar sessions.

In an extended sandwich model [Dagwood](!) there may be a series of rounds of session/experience/session, but in many cases there may be just one round. Thus the concentration should be on the adoption phase of the change process.

If there was just one round, the following sequence might take place.

First, teachers and the consultant meet together to examine the innovation, with the consultant acting as a transmitter of key information to participants. There is an emphasis on two aspects.

1. **Providing sufficient up-front information and encouragement for teachers to decide to trial the new materials and**

2. **Asking them to suspend their final judgement of the materials until they have tried them out.**

Second, teachers trial the materials in their classes, possibly completing a feedback sheet [sample attached]. Where possible, the consultant should be available either on the telephone or in the schools to assist with the day-to-day problems teachers face in the use of the innovation. Through trialling the innovation, teachers develop an informed view of the ideas and materials which will influence further decision making about the use of the innovation. Sufficient time must be allowed for the teachers to trial the materials in normal school situations.

Third, teachers and the consultant meet again to exchange information and ideas on the use of the innovation. This can be thought of as a post-trialling phase and as the first step towards the implementation and continuation stages of the innovation.

The Sandwich Model and the MCTP

The MCTP ideas and materials are likely to be different from those used by many teachers of mathematics, and it is the role of the consultant to set up arrangements which overcome the resulting fears and concerns.

Times and timing. It is preferable that the in-service meetings be spaced so that teachers have the time in between to consider the impact of the MCTP approach in their schools. At the same time, the meetings should not be spaced too widely to lose the original momentum generated, or for teachers to feel that they have lost touch with the group. An interval of between two and five weeks between meetings has been found to work satisfactorily.

Time allocated for the meetings. Full day meetings are preferable, however meetings after school, of length two hours [4.30-6.30] have operated successfully.

Activities in a two session sandwich model

The first session encourages an orientation to MCTP; its aims and approaches. There should be opportunities for teachers to work through a set of materials themselves as students. Ideally, participants also should be able to see the materials in classroom use [live or a video], or if this is not possible, a teacher who has used the materials should address the session.

Overall, session activities should stress the "how to" aspects.

Consultants should be aware that for many teachers, using new ideas and materials involves risk taking and stress. The roles implied in MCTP are new, and make take some learning and ways of approaching mathematics in MCTP may not neccessarily be valued at this stage.

Thus the first session, in addition to orientation, is directed to the reduction of apprehensions about new roles that teachers need to adopt. Teachers involved will have their anxieties reduced if the group is encouraged to accept the view that they are experimenters with an innovation and that risk taking and mistakes are assumed.

Between the Sessions. It is an assumption of the model that the consultant has little or no opportunity to liaise with the participants between sessions.

However, it is inevitable that at least some teachers will encounter difficulties with implementation of MCTP activities and if possible there should be some arrangements through which the consultant could provide assistance when needed.

The Second Session, in part, is used to give teachers a chance to report on their experiences. The first aim is to build further group support for the use of the materials through the exchange of anecdotes and opinions. Some key issues for discussion include:

- problems in setting up for MCTP
- coping with new strategies inherent in MCTP
- student reaction to MCTP
- adaptations; what is feasible.

These discussions relate to the reactions of the participating teachers about their **own** in-class performance. Teachers should come to realise that others in the group will have experienced similar difficulties and triumphs. The consultant should be aware that the acquisition of new skills takes time and that different teachers will progress at different rates. Some teachers who are having difficulties may need encouragement at this time.

Most teachers will have had some success in the classroom, most often manifested by positive student reaction to the materials. Commitment to individual lessons of MCTP by the participants has begun to be developed.

A second aim of the second workshop is to explain the success of the materials in terms of underpinning learning principles. The explicit recognition of these principles by teachers is a step towards generalising them into their long-term practice.

A third aim is to extend the influence of the MCTP with the participating teachers. This will mean opening up ways of writing lessons based on the MCTP approach.

Essentially, this section of the workshop encourages the teachers to act as a change agent in his or her own school. In the time available, only a start can be made on this element. However, the consultant could input to the session through leading discussion and providing knowledge about other teachers experiences in writing MCTP-like lessons.

Examples of the Sandwich Model

Two hypothetical examples of the Sandwich Model, based on actual cases, are listed below. The first involved whole day and the second after school workshops.

Case 1 Whole day workshops

Day 1

8.45	Welcome
9.00	Video on "Real Maths-School Maths" used to provoke discussion of the present state of school maths. Outline of national concerns with school maths and some proposals for change. Australian initiatives and the emergence of MCTP.
	Negotiation of areas of greatest interest or concern to the group An overview of the MCTP approach for exploring other issues [including morning tea].
11.00	Workshops on selected MCTP activities. Focus on how particular issues are treated and embedded within the activities. Perhaps a demonstration within a classroom.

1.00	Lunch
2.00	Participants work in groups to work through additonal MCTP materials as a forerunner to reporting back to the whole group. Issues of preparing for use and actual implementation are compared.
3.30	Where to from here? Participants' tasks in their schools are negotiated and materials and feedback sheets distributed.

Day 2 [approximately two weeks later]

8.45	Introductory activity eg. Estimation of Fractions
9.00	Reactions to trialled materials; how did it go? Successes, difficulties, feeling, reactions of students. Analysis of degree to which desired features were evident in practice.
9.45	Small group work; trialling strategies — groups formed on the basis of common problems reporting to whole group.
11.00	Writing new MCTP like materials; group work
1.00	Lunch
2.00	Where to from here? Strategies for trying out further activities and dissemination of reactions to MCTP.
3.00	Evaluation of the total program

Case 2 After school workshop

Day 1

4.30	Welcome and negotiation of program
4.40	MCTP as a component of state and national programs
4.50	What are the features of MCTP?
5.15	Workshops of selected MCTP materials
6.25	Commitment to trialling materials and arrangements for the future

Day 2 [three weeks later]

4.30	Reactions to the use of the MCTP materials: How did it go? Problems and possibilities.
5.30	How can we incorporate the use of MCTP into existing school maths programs? Writing the outline of a unit.
6.20	Review of the total program.

Users of the Sandwich Model

The model has been used by a number of consultants with the MCTP materials. These include

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Ken Gill	Western Metropolitan Region Education Department, NSW (02) 683-9637
Derek Steenholdt	Westernport Regional Commission Ministry of Education, VIC (03) 781-3177
Russell Keam	Hawthorn Institute of Education Hawthorn, VIC (03) 818-0631.
Howard Reeves	Tasmanian Curriculum Services Branch North Hobart, TAS (002) 30-7178

Mathematics Curriculum and Teaching Program
National Coordinator: Charles Lovitt (03) 628 2272
National Facilitator: Doug Clarke (03) 628 2274
Mathematics Section, Level 4, Rialto Towers,
525 Collins Street (GPO Box 4367, Melbourne 3001)

FEEDBACK SHEET ON MCTP ACTIVITY

School..... **Teacher**.....

School Address .....

Phone..... **Unit**.....

These responses are extremely valuable to us and help greatly in the sharing of ideas. Please don't feel you have to comment in all sections - only those which are important to you. Please be frank!

1. Were you happy with the activity?
   Yes/Maybe/No
   Please give reasons
   .....
   .....
   .....

2. How long did the activity take?
   Did you teach it in one session only or split it up?
   .....
   .....
   .....

3. Did you follow the plan exactly?
   If not, how did (or would) you modify the plan? How did the changes work?
   .....
   .....
   .....

4. Did you use extensions (or invent some)?
   Which ones?
   .....
   .....
   .....

5. In what year level did you use the activity?
   .....
   .....

6. What was the major value of this activity to <u>you personally</u>?
   .....
   .....

7. The activity's major intent is to influence and broaden you teaching style. How could the printed plan be improved in this regard?
   .....
   .....
   .....
   .....

8. In teaching which topic is this activity most useful?
   .....
   .....

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9 How did you organise your room for this activity? e.g. conventional seating, seats arranged into groups, on the floor, multi-purpose room, outside.

10 How did the class in general respond? Did any particular group of students respond differently?

11 One main purpose of the activities is to have pupils develop the ability and confidence to think mathematically outside the classroom. Comment on the activity in the light of this goal.

12 Were the features listed on the front page of the plan evident in the actual class? Which ones?

13 Can you suggest appropiate student assessment techniques (if any) for this activity? How do we know if the children have gained from the activity what we hoped they might have?

14 General Comments

*MANY THANKS FOR YOUR TROUBLE!

PLEASE MAIL THIS IMMEDIATELY TO THE ADDRESS AT THE TOP OF THE FRONT PAGE.

SANDWICH MODEL

ADOPTION IMPLEMENTATION CONTINUATION

Overview If sufficient seminar times available, all stages could be treated. However, in many cases there will only be two or three seminars. In these cases the consultant needs to concentrate on the adoption stage.

ROLES OF CONSULTANTS

Interactive Techniques See the structured course model for the roles of consultants

Logistics

- initial focus is on individual teachers
- stress is placed on facilitating the early stages of adoption.
- later adoption and implementation are left mainly to the teachers.
- seminar time must be carefully planned
- time between seminars must allow time for school trials

IN-SCHOOL INTENSIVE

Description:

This model involves a group of school staff or even a total faculty. The approach includes the following characteristics. First, trials take place within the school of aspects of the change proposal seen to be relevant to the group. The aim is to actively involve as many school staff as is possible, to work collaboratively in order to develop a sense of ownership in the process. The staff group then work intensively on the project over an extended period of time. The support of a consultant is crucial at the adoption stage of the project but may be less necessary at later stages as the group becomes more self-sufficient.

The In-School Intensive Model and the MCTP

The In-school Intensive Model of professional development sits comfortably with the professional development principles enunciated by MCTP. In essence, this model introduces new approaches to the teaching of mathematics and allows them to be considered alongside existing methods in the workplace of the mathematics teacher. It actively engages teachers in the change process and encourages them to support one another while new methods are tried.

The In-School Intensive Model in practice varies in the nature and amount of consultant support required. At the adoption stage, the consultant may be requested to provide significant assistance in:

- establishing the focus of activities
- giving demonstration lessons
- collecting and feeding back information to teachers on their lessons
- analysing and discussing teacher trials with provided activities.

During later stages, the consultant becomes more of a 'critical friend' assisting the group in their lesson and unit writing. At these stages, the consultant assists the teachers in self-examination of their work. The consultant may be required to advise on ways in which problems can be solved and group cohesion enhanced.

Examples of the In-School Intensive Model.

Two hypothetical examples of this model, based on actual cases are described below. The first involved a group of staff teaching mathematics at the year seven level and focussed on several MCTP/RIME (Reality in Mathematics Education) features that they found attractive in terms of inclusion into their existing curriculum. The second example is based upon the work of the primary-level Key Group Pilot Project which is a school-based teacher professional development program which aims to create opportunities whereby a group of teachers work co-operatively on improving an area of their mathematics program.

Case 1. Year 7 Mathematics Staff-Building from the Existing Curriculum Topics

This case has been carefully documented and is available from the Mathematics Education Centre, Faculty of Education. Monash University.

Reference: Sigurdson, S.E., *The Caulfield Mathematics Challenge* Monash University Mathematics Education Centre, Dec. 1985

Initially, the consultant visited the school and discussed with staff those features of the range of MCTP approaches which were most attractive in terms of inclusion into their existing curriculum at year seven level.

The teachers were then involved in a four week 'course' consisting of an initial seminar outlining the purposes/philosophy of the MCTP and some demonstration activities. Each week the teachers watched (or gave) a demonstration activity, selected from the MCTP bank because of the features it promoted and its consistency with current topics in the year seven program.

The teachers were then involved in a four week 'course' consisting of an initial seminar outlining the purposes/philosophy of the MCTP and some demonstration activities. Each week the teachers watched (or gave) a demonstration activity, selected from the MCTP bank because of the features it promoted and its consistency with current topics in the year seven program.

Each teacher taught that lesson to his/her own class and then selected and taught a similar lesson, also drawn from the MCTP bank. A formal sharing session and discussion of features followed.

At the completion of the four week period, the teachers were offered the complete bank of MCTP lessons to use in any way they saw fit over the next four weeks, with a commitment to teach at least two lessons from the bank each week.

Finally the teachers were involved in an action planning session to decide "where to go from here."

Case 2. A School 'Key Group' Project

The 'Key Group' project was a major BLIPS (Basic Learning in Primary Schools) initiative of the Victorian Ministry of Education. This project took groups (Key Groups) of at least three Prep to Year 3 teachers from one school and assigned to each group a mathematics consultant. During a three-day live-in conference, the participants discussed the characteristics of good mathematics teaching and learning. Each Key Group then decided on some aspect of their mathematics teaching which they wanted to jointly improve and devised a plan of action for tackling it.

Back in their schools, each group received a $300 grant and twelve days of teacher-release from classroom duties for their use, to help implement the group's action plan.

After a detailed evaluation of 36 Key Groups, the coordinators of the project stated:

> "The Key Group model works because it taps the teacher's natural desire to improve his or her practice and removes the constraints - lack of time, support, recognition and money- which normally militate against this natural desire becoming activated. By empowering teachers to change themselves, rather than attempting to coax or coerce them to change from the outside, we have maximised the chance that real and lasting improvements to classroom practice will occur and children will benefit."

IN-SCHOOL
INTENSIVE

	ADOPTION	IMPLEMENTATION	CONTINUATION
Overview		All stages could be included.	
ROLES OF CONSULTANTS			
Interactive Strategies	Support of consultant might concentrate on adoption and implementation stages. See structured course model for roles of consultant in each stage		
Logistics	-negotiate with the teachers the focus of the activities	-assist teachers to prepare a plan of action for implementation and evaluation	-help the group of staff work together to initiate action -act as critical friend

- Wherever possible **groups** of teachers are the focus.
- Support is given by the consultant, particularly at the adoption and implementation phases of the change process.
- The emphasis is on a key group of staff **supporting one another.**

SCHOOL CLUSTER GROUPS

Description

In this model, an innovation is trialled in a number of schools over a common period of time, and there is continuous and intensive interaction between teachers in the schools about the use of the innovation.

Ideally, the schools concerned will be in a close geographic location, to facilitate meetings between the teachers concerned, but the model has also been implemented in situations where this has not been possible. In these cases, other methods of contact, such as telephone or through a consultant, need to be employed.

The model relies on mutual support and the transfer of expertise between teachers for its effectiveness in spreading knowledge about the innovation **between** the cluster schools. This is achieved by the selection of a teacher in each school who is willing and able to trial the materials of the innovation. In turn, this teacher is expected to act as a source of information and support for other teachers in the school for the **internal** dissemination and use of the innovation in that school.

The role of the consulant is to set up the network, provide the links between the innovation and the teachers concerned, in the early stages of its life, provide ongong support as the work of the cluster develops, and assist the teachers in decisions about termination of the network when it has achieved its objectives.

The School Cluster Groups Model and the MCTP

The use of MCTP materials and ideas with classes and developmental work based on these ideas at the school level are the objectives of the model.

Consultants may need to use their local knowledge of schools and of individual teachers within these schools in making decisions about locations where the cluster is likely to get off the ground.

One approach to the task is to identify a staff member in each of the schools in the cluster who has the reputation of being an innovative teacher and who is willing to become involved. The MCTP materials are introduced to these teachers, either in a group or singly and they are encouraged to use them with their classes. Regular group meetings are then held to discuss progress, with the consultant acting as a coordinator and/or mediator. In this approach, these teachers are then expected to disseminate information about MCTP in their own schools and to encourage the use of MCTP by their colleagues.

An alternative approach is for the consultant to identify a 'lighthouse school', where a whole school mathematics staff are willing to trial the materials. After the staff have gained familiarity and confidence with MCTP, teachers from other schools are invited to the school to watch lessons and to consider the adoption of the materials in their school. In addition, staff from the lighthouse school are encouraged to visit other schools to assist teachers in these schools to consider the MCTP approaches.

The role of the consultant is primarily that of organiser: to set up the cluster, to act as a coordinator of the group, and to liaise with the central MCTP team. The consultant may not be be required to demonstrate MCTP lessons, as the lighthouse teachers or school are assigned the role of providing content and teaching strategy expertise to others.

The consultant is thus concerned with the processes of change:

- advocating the use of resources in the state or region for setting up and maintaining the cluster
- knowing which teachers and schools to select as lighthouses
- approaching other teachers and school in ways likely to promote interest and enthusiasm
- planning the activities of the cluster in ways that promote a sense of purpose and direction to the participants
- encouraging the continuation of activities in the schools when system level resources such as funding have run out
- knowing when to involve external 'experts' such as staff of the MCTP team or from tertiary institutions
- undertaking evaluation of the progress of the cluster
- selling the educational advantages of the MCTP approach to those outside the cluster; for example decision makers such as principals and regional directors
- informing parents and other interested groups about the advantages of the MCTP approach.

Examples of the School Cluster Groups Model

An educational region set up a RIME Cluster network which had the following stages:

1. Three schools were chosen by the regional consultant as pilot schools. As a group these schools represented a variety of school sizes and types.

   A factor in their choice was the existence in each one of an appropriate teacher. It was recognised that the teachers involved needed to be open-minded, confident and good classroom practitioners.

2. A meeting was held with these pilot school teachers and the consultant, to outline the philosophy and goals of the project. The teachers were gratified that they had been chosen and agreed to participate in the initial trialling.

3. Once a week for three weeks a demonstration lesson was given in each of the three schools by the pilot teacher. Where possible, other maths teachers in the school watched the lesson. Discussion among the teachers followed the lesson.

4. During the following six weeks, the pilot teacher taught other MCTP activities and assisted the other teachers to try the methods.

5. After five weeks the teachers developed a feel for the approach and some were ready for the next stage:

   — participating in giving lessons in other schools. Teacher release days have been obtained for this after representation from the regional consultant to the regional board.

   — writing lessons themselves and trialling them.

   — encouraging teachers in other schools to trial MCTP and school-developed lessons.

Sources of Information on the School Cluster Groups Model

Within the Ministry of Education in Victoria, several cluster networks have been set up, for example in the Ballarat and Loddon-Campaspe-Mallee regions in rural areas, and the Northern, Western, and Tullamarine regions in metropolitan Melbourne. Some of these clusters have been set up to encourage the introduction of the Realty in Mathematics Education Project [RIME], which is closely associated with the MCTP. Groups involved in this way include the Ballarat Region and the Swan Hill Education Resource Centre, Ministry of Education, Victoria.

The cluster network has also been employed to introduce new approaches to mathematics [again in primary schools] in the schools of the Catholic diocese of Armidale, NSW, through the Armidale Lighthouse Maths Project.

A program titled "The Mathematics Research Project", a joint initiative of the Catholic Education Office and the Association of Independent Schools of Victoria also falls within this model.

SCHOOL CLUSTER GROUPS

	ADOPTION	IMPLEMENTATION	CONTINUATION
Overview	All stages could be included if cluster develops and on-going commitment to change. Role of consultant is to encourage teachers and schools to move through stages.		

ROLES OF CONSULTANTS

Interactive Strategies	Consultant could be needed at each phase; see structured course model for strategies within stages.		
Logistics	-selection of a cluster of schools that is likely to succeed because of location, links, personalities or -establish the innovation in one 'light house' school and use it and its staff to sell the approach to other teachers and schools. -help organise the cluster framework/ network and resource it.	-encourage commitment network to support itself	-encourage network to document and evaluate its work

- Consultant acts primarily as an organiser and a 'linker'; linking system resources to schools, school with school, teacher with teacher, learning materials to teachers.

THE POSTAL MODEL

Description

As the name implies, in this model the mail is an important medium for disseminating the innovation. Generally, explanatory materials and a units or activities are sent to individual teachers. There is a commitment on their part to trial several or all of them.

The major feature of the postal model is that teachers are likely to make an initial contact with the developers of the innovation, and rely mainly on materials sent to them as a stimulus for changing their teaching and curricula.

The potential of the postal model is that it can support individual teachers in remote locations.

The model incorporates the use of consultancy support where possible, for example through an intensive introductory session or an occasional sharing day during the use of the materials in schools.

Given the difficulty and expense of bringing people together, particularly in remote areas, it is important that these sessions are expertly planned and conducted. The exact form of these sessions will depend on the needs of the teachers, and this in turn depends on the stage of knowledge and use of the innovation.

The Postal Model and the MCTP

For many teachers the ideas and materials of the MCTP will be different from those which are being used in schools.

As indicated above, the effective use of in-service days in remote areas is of highest priority. One way of ensuring the effective use of these days is for the consultant to be aware of the stage of development of the teachers in the use of the MCTP materials.

The consultant needs to devise ways of determining the stage of concern of the teachers involved. This might be done by contacting the central MCTP team, or alternatively writing to teachers involved.

If teachers are at different stages of familiarity with MCTP, it is possible to use the expertise of participants to inform others who are at earlier stages.

As with other models, there needs to be an emphasis on "how to" in the sessions.

Workshops should also be used to build on-going networks between participants.

Examples of the Model

Few uses of the postal model have been documented. However, an hypothetical case could involve a consultant, say in conjunction with a subject association, running an initial session with a view to establishing links with MCTP. Materials from the program might then be sent by mail to the teachers concerned.

POSTAL MODEL

	ADOPTION	IMPLEMENTATION	CONTINUATION

Overview All stages could be covered by individual teachers. However interactive sessions are limited and should concentrate on adoption stage.

ROLES OF CONSULTANTS

Interactive Strategies If sessions are held please see structured course model for roles of consultant

Logistics

- Meetings if possible should be at beginning of the process and crucial for adoption phase.
- Contact between MCTP central team and consultant can assist the coordination of external support.
- Use of tele-conferencing should be investigated.

If no initial meeting

-sending most materials and guidelines for use through the mail	-encouraging teacher to write lessons and trial them in the schools	-encouraging teacher to write units for their schools
-assisting teacher to trial the units through telephone or mail links	-assisting teachers to link these activities through telephone or mail links	-assisting teachers to refine their units through telephone or mail links

PRE-SERVICE MODEL

Description

In this approach the innovation is introduced to pre-service teacher education students during their mathematics teaching method subject and subsequent school experience teaching rounds.

The aim is to assist student teachers to make connections between the theory of "good mathematics teaching" and classroom practice by helping them to broaden their repertoire of teaching styles and approaches. This is enhanced by providing them with 'proven' models to use.

The project is organised and conducted by the staff of the teacher education institution and involves students in trialling carefully selected activities in schools as part of their practice teaching. Upon return to the institution, students are helped to reflect upon the experience and share their learning with staff and fellow students.

The Pre-Service Model and the MCTP

While it may seem obvious that pre-service teacher education students should be aware of innovative approaches to mathematics teaching and learning and have had the opportunity to practise these in classrooms, this has often been shown not to be the case. The supervising teacher with whom the student teacher works may not be using approaches to practice that are inherent in MCTP. With the absence of demonstrations and modelling of innovative approaches to mathematics teaching and an expectation to practise these during teaching rounds, the student teacher may not be encouraged to risk-take. In the Pre-service Model, such demonstrations are given and the expectation of trialling is part of course requirements. If student teachers are provided with the opportunity to consider the philosophy and practice of MCTP during pre-service education they will be more likely to be amenable to this innovative practice later in their career.

A valuable by-product of the Pre-service Model is the possibility of introducing **supervising teachers** to innovative mathematics practice in a relatively non-threatening way. One possible role of the consultant is to follow-up the supervising teachers whose classrooms are involved in the mathematics method project, in order to assess impact and possible interest in the MCTP.

Another aspect of consultant role in this Model is to be a linker of (1) MCTP materials to the staff of teacher education institutions; (2) participating tertiary institutions with others not yet involved.

Examples of the Pre-Service Model.

This model has been accepted for trialling and is currently operating in about ten tertiary institutions. The process was first trialled at Monash University in the Faculty of Education where it was decided to require each pre-service education student undertaking mathematics method to teach at least one carefully selected MCTP activity as part of their practice teaching. The procedure chosen to implement this was as follows.

1. In a workshop situation at the university, the rationale of the exercise was explained as student teachers worked through a number of activities which had desirable features other than those in many traditional lessons. These included estimation, problem solving, use of technology, group work, the outdoors and real life applications.

2. During preliminary visits to schools, topics were allocated for the teaching round by supervising teachers in the usual way.
   E.g. Year 8 Linear Equations.

3. The method tutor discussed with each student teacher one or more appropriate MCTP lessons to try on the teaching round.

4. The student teacher taught the lesson(s), and together with the supervising teacher completed the feedback sheet (sample attached).

5. After the round, in the tutorials, student teachers shared the experience with others, focusing on the features that made the lesson different from the conventional lesson.

Sources of Further Information on the Pre-service Model

Clarke, D., Secondary Mathematics Teaching: Towards a Critical Appraisal of Current Practice, *Vinculum,* 1984 21 *(4)* 16-21.

Clarke, D., and Blane, D., An Evaluation of Pre-Service Mathematics Teacher Education at Monash University. Paper presented at ICME V , Adelaide, 1984.

PRE SERVICE MODEL

	ADOPTION	IMPLEMENTATION	CONTINUATION
Overview	Emphasis on adoption. Consultant has little direct influence. Leaders likely to be skilled and knowledgeable.		
ROLES OF CONSULTANTS			
Interactive Techniques	-		
Logistics	-encourage pre-service teacher education institutions to consider the program -provide materials to the staff of institutions -collect information about the logistics and forms of the program and circulate it to interested institutions -follow-up supervising teachers in the schools to help assess impact and possible interest -support interested teachers as required	-encourage staff of institution to have students write new units for the activity bank of MCTP	

- The consultant links the MCTP project with the staff of pre-service teacher education institutions.
- Stress is placed on facilitating adoption by the education staff pre-service students and supervising teachers.

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FEEDBACK SHEET ON MCTP ACTIVITY

Student's Name: _____ **Tutor:** _____ **Basic/Further**

Teaching Round Number: _____ **University/College:** _____

Lesson Title: _____ **Year Level:** ____

Topic: _____

School: _____

1. Were you happy with the lesson overall? Yes/Maybe/No
Please give reasons.

_____

_____

_____

_____

_____

_____

2. Suggestions: (circle those most pertinent. Add others above.)

Positive: Motivating. Involved all students. Developed problem solving. Right length. Catered to all ability levels. Practical. Easy to prepare. Easy to manage.

Negative: Dull. Students not interested. Too easy for students. Too demanding for pupils. Too long. Too short. Too fast for some. Too hard to prepare. Too hard to run. Students 'fooled around'.

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3. MCTP wants you to feel free to adapt the lessons to your class and conditions — to put some of yourself into it. For possible rewriting, MCTP wants to know what improvements you made.

Did you teach the lesson exactly as written up? Yes/No

Please give rough timing for each stage. Total mins.

Stage 1 _____ 2 _____ 3 _____ 4 _____ 5 _____

If not, (a) Describe the changes you made.

_____

_____

_____

(b) Did the changes prove a good idea? Give reasons.
(What guidance could be given to other teachers?)

_____

_____

_____

4. Describe your class (number of students, etc.)

_____

_____

_____

5. Explain how the lesson fitted into the overall plan for the topic,
ie. Give rough details of the lessons before and after this one.

_____

_____

_____

_____

_____

6. Lessons can be used to serve many purposes, all valid. Please rate (from 1 to 5) the main features worth stressing in this lesson.

Examples: (number five, or add others)

Concept, Skill, Application, Estimation, Problem Solving, Logic, Use of Outdoors, Use of Calculator/Computer, Caters for wide range of ability, Group work, Practical work for pupils, Teaches content well, Use of Video, Role of Discussion.

_____

_____

_____

_____

7. MCTP is looking for specific ideas for improving the lesson — to make it better for pupils to experience and easier for teachers to teach.
Please note any ideas here. (If you think you would teach it differently next time, describe the changes you would make.) Use extra space if needed.

8. Did you use group work in the lesson (pupils in small groups)?

If yes, (a) how did it go? Why?

(b) How could this aspect be improved?

9. Please add any other suggestions for MCTP not covered above.

10. **Supervisor's Comments:** Please ask your supervisor to comment on the lesson overall. Suggested improvements would be helpful.

Supervisor's Name: _____

Date: _____

Please return this feedback sheet to your tutor, or the address above (as arranged by your tutor)

CLINICAL SUPERVISION MODEL

Description

Clinical supervision provides clearly-defined procedures by which teachers themselves can critically examine what they do, with a view to facilitating change in their practice and professional understanding.

In essence, clinical supervision employs a cyclical process of a pre-observation conference, observation, analysis and post-observation conference, in order to support the teacher to systematically reflect upon practice and plan the focus of the next cycle.

The teacher is helped in this reflective process by trusted colleagues ("critical friends") who are interested in collaboratively inquiring into their own teaching. This is achieved by making explicit their classroom practice, and engaging in discussion about actual teaching experiences. In this way it is hoped that taken-for-granted assumptions about teaching and learning are talked about and challenged; effects of teacher actions on students are considered; and insights are gained as a basis for trialling alternative actions in the classroom.

The Clinical Supervision Model and the MCTP

Many of the assumptions underlying MCTP sit comfortably with this model of professional development. For example, the long-term objective of the Program is to empower teachers to generate change in the mathematics teaching in their classrooms and schools. Clinical supervision certainly aims to build the confidence of teachers to investigate their own teaching, with the expressed outcomes of greater understanding of education and improvement of practice.

However, the nature and extent of the influence of the consultant on the teachers is not able to be forecast. There is no guarantee that the clinical supervision process will result in the teachers embracing the view of mathematics teaching and learning that underpins MCTP.

The consultant may very well be accepted by the teachers as a trusted colleague and "critical friend." However, because clinical supervision respects and develops teacher autonomy and empowerment, the teacher is not likely to tolerate a consultant who is delivering a message to them and is not really interested in their current practice and views of mathematics teaching and learning.

A consultant who is committed to a clinical supervision approach to professional development needs to be available to work in the teacher's own working environment as a critical friend for an extended period of time. One objective could be to help build a team of teachers in the school to act as facilitators themselves and so to provide support and guidance for other teachers in their schools.

Examples of the Clinical Supervision Model

Although there have been no recorded studies of a consultant in the Mathematics Curriculum and Teaching Program using this model of professional development, there are many documented case studies in clinical supervision.

Reference: Smyth, W (ed) *Case Studies in Clinical Supervision.* Deakin University,1984.

CLINICAL SUPERVISION

	ADOPTION	IMPLEMENTATION	CONTINUATION
Overview	No necessary sequence implied. Help could be given by consultant at any of the three stages		
ROLES OF CONSULTANTS			
Interactive Strategies	See structured course model for possible roles of consultant in each stage of the process		
Logistics	-responding to the invitation from teachers to be a 'critical friend' during initial reflection on teaching -choosing the appropriate time and occasion to present information on the innovation and even demonstrate the approach if desired -help teachers use the cyclical process of clinical supervision -facilitate arrangements (eg.time-release) for teachers to work together	responding to the invitation from teachers to be a 'critical friend' during initial use of the innovation	responding to the invitation from teachers to be a 'critical friend' during the maintenance of the innovation

- The consultant relies on the teacher to request information on the innovation before intervening.
- The skill of process consultancy related to improving interpersonal procedures is particularly relevant (eg. communication skills).

ACTIVITY DOCUMENTATION

Description

As the name implies, this model involves the documentation of successful innovative practice so that activities developed by one teacher, or a team of teachers, can be more widely circulated. In the field there are many teachers working at the "cutting edge" of innovative mathematics and successfully implementing new dimensions into their teaching. Tapping into this knowledge and showing images or models of such successful and quality practice is the purpose of activity documentation.

When teachers within a school and/or between schools document their activities and contribute them to a central clearinghouse, an information network is established. Such networks may remain informal or, with additional organisation, may be formalised.

Activity Documentation and the MCTP

Collections of activity ideas that have been compiled by **practitioners** are most appealing to teachers for very obvious reasons. They derive from practice and are able to be modified to suit different classrooms and teachers.

MCTP seeks to collect working examples of good practice, and by thorough documentation and trialling aims to assist teachers to learn from each other and hence provide the sort of learning experiences they seek for their students. To this end consultants, advisors and pre-service teacher education institutions are encouraged to establish "networks" of activity writers.

Trying to capture the spirit as well as the structure and the content of classroom activities is a complex and difficult task. The most usual form of documentation is the printed word, but other formats such as videotape are possible.

Examples of Activity Documentation.

As part of the Mathematics Research Project, a BLIPS funded initiative by the Catholic Education Office and the Association of Independent Schools of Victoria, 12 'lighthouse' schools were targeted. Three K-grade 3 representatives from each school were involved in the following activities:

Day 1

1. A whole day in-service devoted to emerging emphases in mathematics teaching and learning.
2. As part of the day, each school was invited to bring along one activity of special interest, documented according to a provided proforma .
3. A 1 1/2 hour workshop, with about six teachers in each group took place. Three activities were presented and discussed.
4. Teachers undertook to trial at least two of the activities during the following school week.

   An initial offering of 12 activities resulted from the trialling.

Day 2

One week later a half-day follow-up in-service activity took place as follows.

1. (9.15 — 10.15) Teachers shared (in small groups) their experiences with the activities in which they had been involved with their classes during the week. Detailed discussions took place, with anecdotes, difficulties and joys being shared. There was emphasis on the underlying learning principles.

2. (10.15 — 10.45) A structured session , detailing the nature and purpose of documentation, and its importance in the sharing of learning environments hitherto not available to many teachers, took place. Samples of documentation styles were provided and discussed.

3. (11.00 — 12.15) Teachers selected just **one activity** and groups were formed for the purpose of producing a **comphrehensive documentation** for each particular activity. The time allotted was not quite sufficient for this and an elected recorder in each group was responsible for handling in a neatly written draft version within the next week.

After discussion it was decided that eight of these activities had great potential and should be more fully and carefully documented. The eight activites were collated , printed and distributed for formal trialling to all participants.

ACTIVITY DOCUMENTATION

	ADOPTION	IMPLEMENTATION	CONTINUATION
Overview	Emphasis on the implementation and continuation stages. Consultant unlikely to be involved in interactive strategies. Role is one as a collector and disseminator of information.		
ROLES OF CONSULTANTS			
Interactive Strategies	-		
Logistics	-facilitating transfer of MCTP lesson and their use from school to school -building up a central bank of good ideas	-facilitating transfer of MCTP units and report of the case in schools -building up a central bank of good units	

- Consultant needs facilities to store and update information.
- Consultant acts as a postman in the dissemination of ideas and materials from teacher to teacher/ school to school.
- Assumption is that adoption has **already taken place** (perhaps through the use of one of the other models).
- Consultant must be seen to match needs of teachers with available information from other teacher sources.

APPENDIX

The Stages and the Roles of Consultants

This distinction between phases of acceptance of an innovation [MCTP] by an individual and organisation is of importance when considering the role of a system of consultancy in a region or diocese. The system which works hard to have an innovation "**adopted**" but fails to support the "**implementation**" and "**continuation**" phases does little to help lasting change to occur in schools and classrooms.

One noted writer on change states this another way when he asserts:

> "....in deciding on or assessing the role of consultants we should have in mind not only whether they obtain or provide good information on given occasions (eg. a workshop), but also whether they or someone else follows through to provide support for the use of that information."

Thus the objective of a system of consultancy is to provide support conditions such that a school can progress to the continuation stage of use if it wishes to do so.

All of this implies that change takes **time** and that help over an extended period is a neccessary condition for change in schools.

Consultation can thus best be seen as providing on-going help. In educational consultation this help may take many forms including: giving information, helping teachers collect information, showing how to do something, giving advice, guiding practice, listening to teachers and discussing teacher practice.

In this sense the consultant as facilitator combines content expertise in the subject matter of the innovation (in this case Mathematics); with knowledge of the change process; and process skills and strategies that help teachers, groups and schools during the phases of acceptance of the innovation.

Inside and Outside Consultants.

Many school systems in Australia maintain the availability of **inside** consultants for schools. These are people attached to a region, district or diocese with an on-going support role to schools. **You are almost certainly an inside consultant** .

There are numerous types of **outside**, or external, consultants who work for tertiary institutions, private consultancy firms or government agencies.

There are obvious roles for inside and for outside consultants. According to two writers who have studied consultancy in detail the inside consultant is

> "(1) ..... more easily available than the outsider; (2) the insider knows useful information about the setting, can get into the task faster than the outsider and can avoid political mistakes an outsider might make; and (3) the insider shares a 'common fate' with the clients and can inspire their immediate trust."

Among the disadvantages of inside consultation are that

> "(1) inside people usually have work loads calibrated to average demand and therefore are unable to undertake exceptionally large projects without putting aside other regular duties; (2) simply because they are locals, they may not be seen by the clients as experts; (3) their knowledge of the [situation] may be biased; and (4) the very fact of their 'common fate' with the clients may dissuade them from taking risks that a change project requires."

In practice, outside consultants are useful for 'one-off' seminars and lectures but it mostly falls to inside consultants [at least in Australia] to provide the ongoing support needed for effective change in schools.

The Target Audience of Consultation

Ultimately it is at the **individual** teacher level that change does occur. Teachers have to change their practice in planning, teaching and evaluating before major changes are possible, in children's learning of mathematics. Eventually, this may require them to change the beliefs they hold about the teaching and learning of mathematics.

Thus, the individual teacher is the major client of the consultant and it is with the teacher that the consultant spends most time. It is not surprising therefore, that consultancy skills associated with working with individuals have been developed and refined.

However, for the MCTP approach to be implemented and reach continuation, organisational changes are also necessary. One reason is that a whole mathematics department might need to be involved in the decision to use a MCTP-based unit in the maths program at a school.

Increasingly, effective models of professional development are concerned with the formal and informal structures of the school and department or faculty of the school. The consultant working within these models aften needs to work on developing consultancy skills associated with **group processes and decision making.** Effective implementation of an innovation involves the development of both individual and organisational meaning associated with the MCTP project.

The objective of the model is to provide support for these teachers and schools by providing a base through which developments based on MCTP can be exchanged.

The consultant is thus in the role of linker and facilitator of contacts between the users.

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DRAFT

MATHEMATICS CURRICULUM AND TEACHING PROJECT [MCTP]

EVALUATION OF THE PROFESSIONAL DEVELOPMENT GUIDELINES FOR THE MCTP

Dear Colleague

During 1987 we hope that you will get a chance to use the enclosed DRAFT COPY of **Professional Development in the Mathematics Curriculum and Teaching Program.**

We emphasise that these **Guidelines** are in draft because we need your opinions of its worth and usefulness to refine it before it is distributed and used more widely.

This form is designed to assist us to improve and refine the outlines of individual models contained in **Section Two** of the **Guidelines**. We would be grateful if you could take a few minutes to **complete a form for each model** you have used and send it back to the staff of the MCTP.

We would appreciate receiving feedback at any time during the year, but given the fact that you may need time to consider the Guidelines in the light of experience may we suggest a date towards the end of the year when all feedback be returned; say Monday 5 October 1987. This will give us time to revise the Guidelines before the conclusion of the year.

(Please complete separate forms for **each** of the models you used this year. We have included several copies of this form to assist you in this aspect of the evaluation).

Thanks for your help with this evaluation.

John Owen and Neville Johnson

A joint project of the Commonwealth, States and Territories
Curriculum Development Centre

PART ONE: FOCUS ON THE MODELS SECTION OF THE MANUAL

1. Think about a professional development activity you used in mathematics this year which was based on a model in the GUIDELINES.
Which of the following models was this activity **MOST like** ? [tick one]

(i)	structured course	☐
(ii)	sandwich	☐
(iii)	in-school intensive	☐
(iv)	school cluster groups	☐
(v)	postal model	☐
(vi)	pre-service model	☐
(vii)	clinical supervision	☐
(viii	activity documentation	☐

2. Which of the following best describes **YOUR** use of the model outline in this activity?

(i)	I followed the approach for this model very closely	☐
(ii)	I made some minor adjustments to the model	☐
(iii)	I made major adjustments to the model	☐

If your answer was (iii) please describe these adjustments briefly

_____

_____

_____

_____

3. For **this model** the information in the GUIDELINES was (tick one box per line)

(a)	not very informative	☐	☐	☐	☐ very informative
(b)	not very relevant	☐	☐	☐	☐ extremely relevant
(c)	difficult to comprehend	☐	☐	☐	☐ very easy to comprehend
(d)	too detailed	☐	☐	☐	☐ could be more detailed
(e)	too directive	☐	☐	☐	☐ could be more directive

(f) If you wish please write a short note on any or all of these aspects in the space below to explain the answers above

_____

_____

_____

...2

(g) In the space below we would appreciate suggestions about **changes** to the information in the GUIDELINES **about this model.**

Suggestion1

Suggestion 2

PART TW0: FOCUS ON THE OVERVIEW SECTION OF THE MANUAL

(You may wish to complete this just once if you are reporting on your use of more than one model).

4. Now, which of the following best describes your present familiarity with SECTION ONE OF THE GUIDELINES (the first 8 to 10 pages of the document)?

(a) I have skimmed through Section One

(b) I have skimmed through Section One and referred to it again on a number of occasions

(c) I have read Section One carefully

(d) I have read Section One carefully and referred to it again on a number of occasions

5. In the space below, tell us about changes you would wish to make in Section One to make the GUIDELINES more coherent.

6. In the space below, tell us your opinions of the document **as a whole** and any suggestions for change.

7. Finally, could you tell us:

Your name _____ Today's date _____

Address _____

WE WOULD BE GRATEFUL IF YOU COULD ATTACH DETAILS OF THE PROFESSIONAL DEVELOPMENT ACTIVITY YOU HAVE JUST DESCRIBED TO THIS CHECKLIST. THESE DETAILS WILL BE A VALUABLE RESOURCE TO US IN PREPARING THE FINAL FORM OF THE DOCUMENT.

Please return this form and attached details to:

Mathematics Curriculum and Teaching Program
Charles Lovitt & Doug Clarke [03] 628 2272
Mathematics Section, Level 4, Rialto Towers,
525 Collins Street, Melbourne 3001.